

20042605.010902

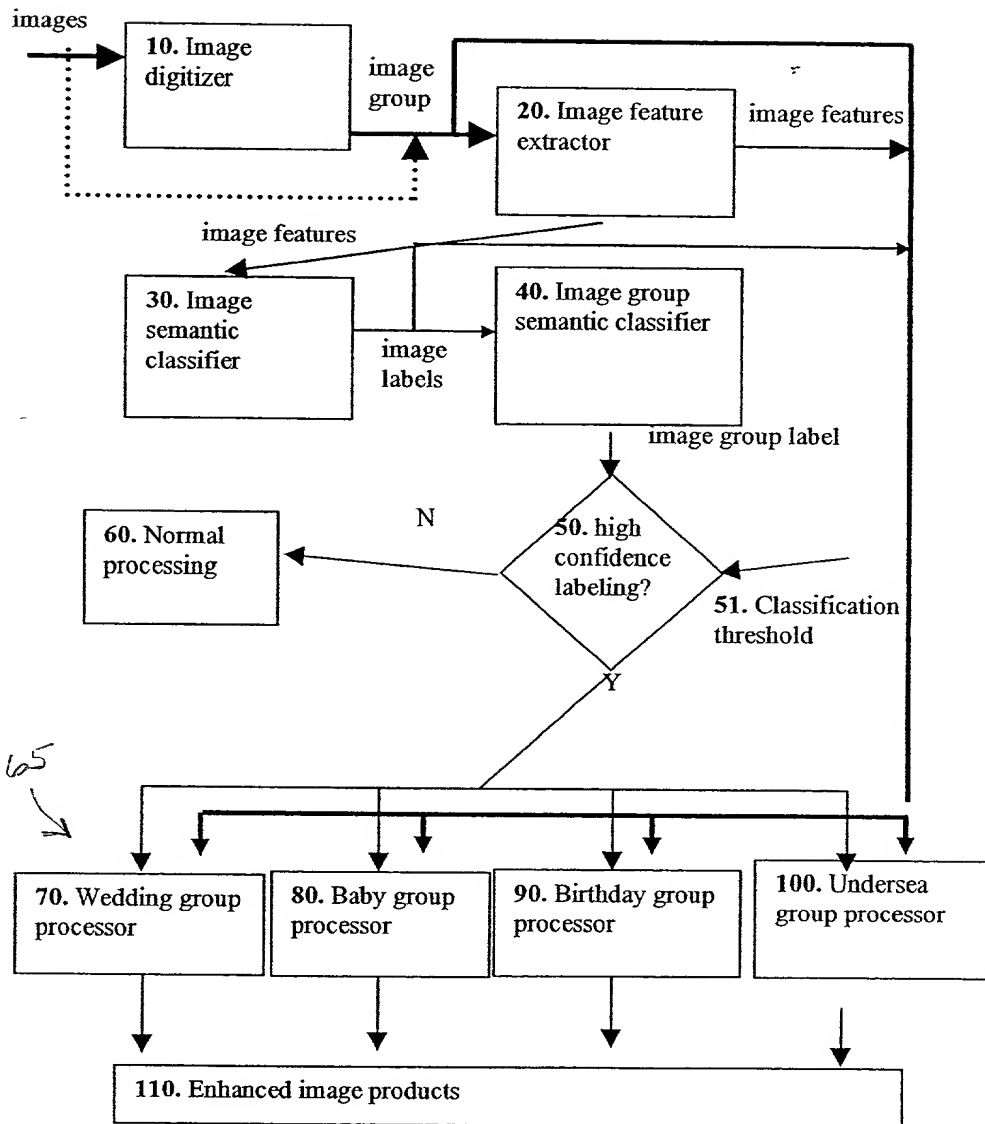


FIG. 1

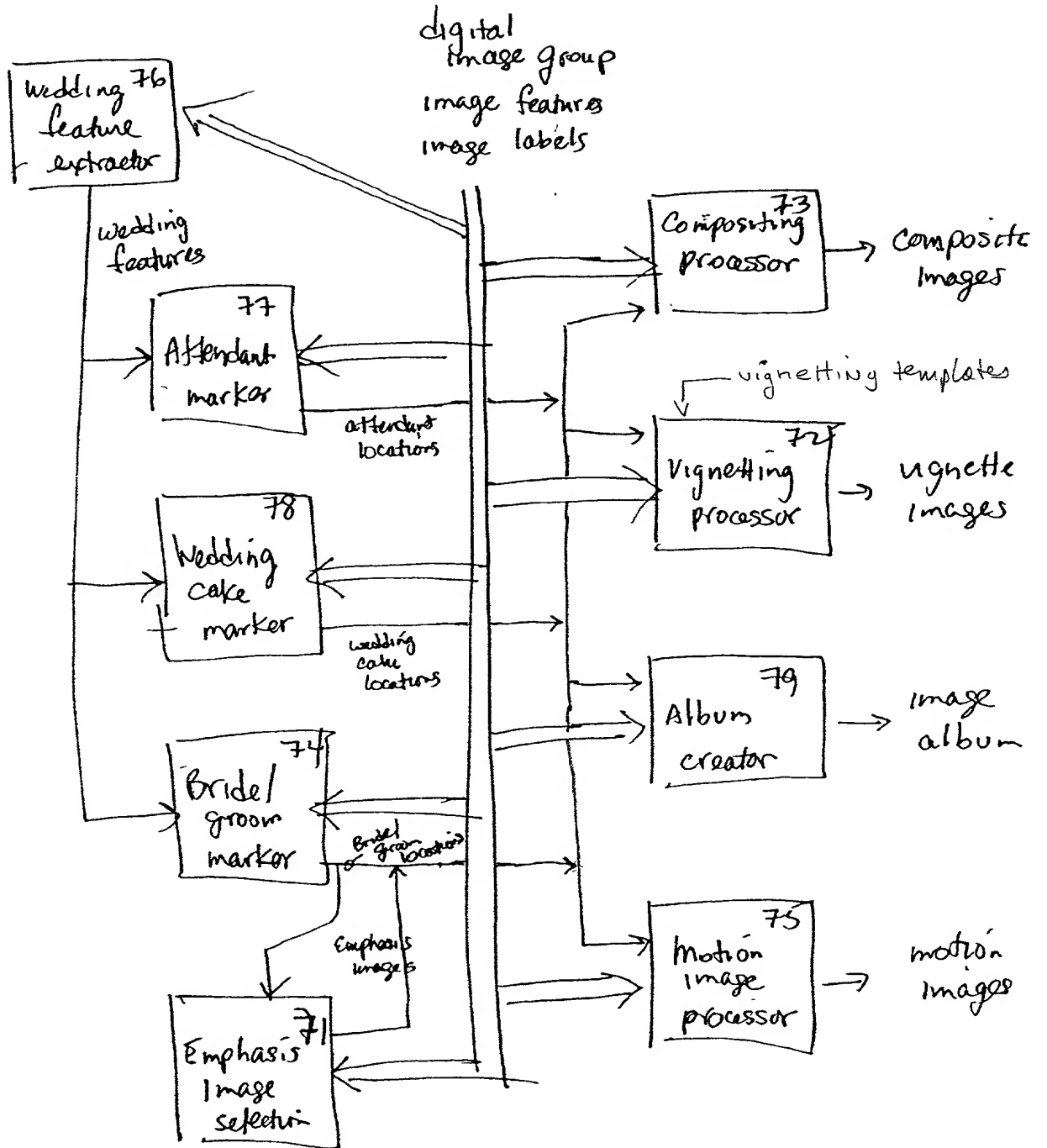


Figure 2

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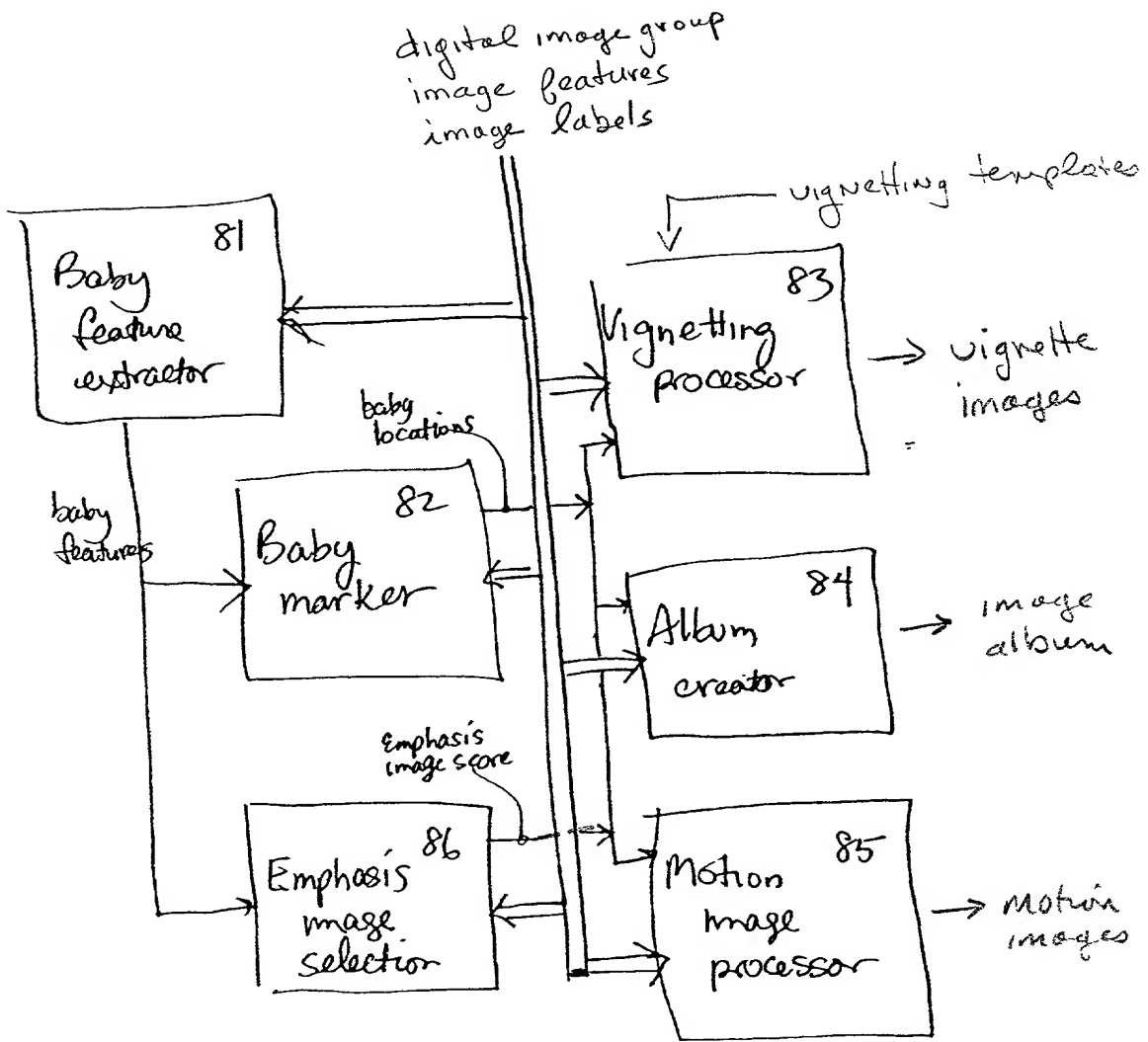


Fig. 3

digital image group
image features
image labels

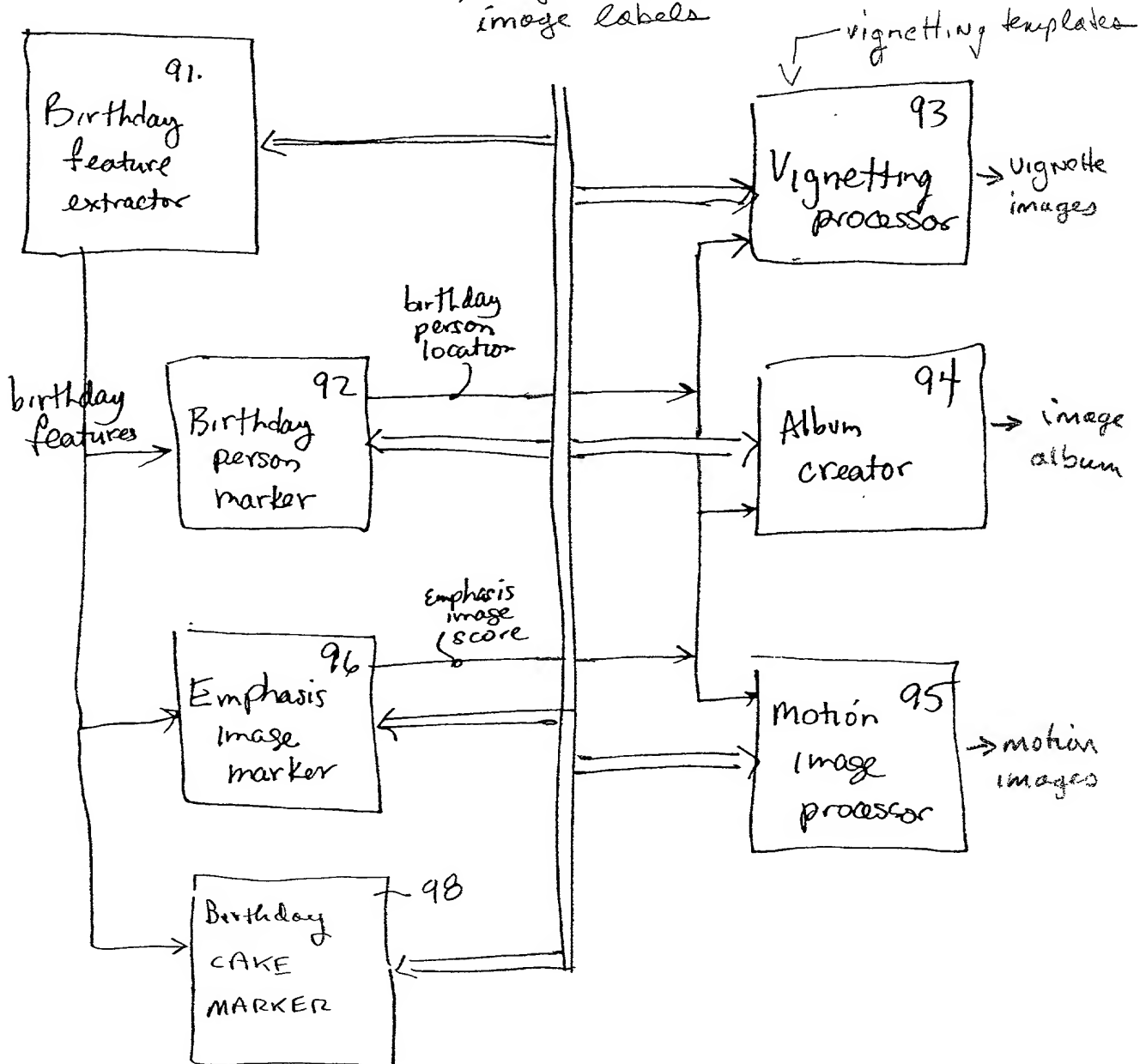


Figure 4

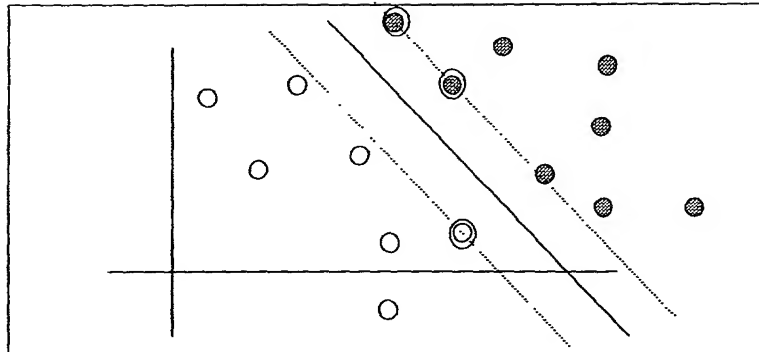


Figure 5 Linearly separable problem with hyperplane. Support vectors are circled.

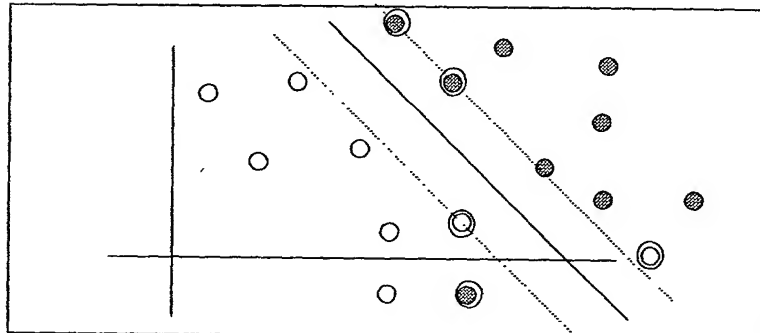


Figure 6 Linear, non-separable problem with hyperplane. Support vectors are circled. Training cases that cannot be classified correctly are automatically included among the support vectors.

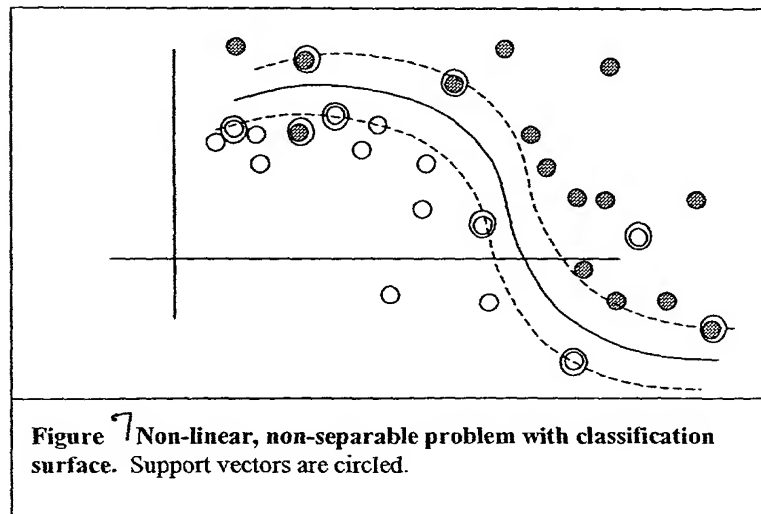


Figure 7 Non-linear, non-separable problem with classification surface. Support vectors are circled.

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Figure 8 Principal components of face subregions.

Component	1	2	3	4	5	6	7	8	9	10	11	12
low resolution	412	306	244	172	160	138	110	109	102	95	81	83
medium resolution	420	307	235	169	157	141	114	111	98	95	81	83
high resolution	337	278	252	196	161	179	127	116	121	111	103	89

FIG. 9 Variance along principal components for sub-regions of pose 3 face images.



Figure 10 Face poses 1-5 (first column), 6-10 (second column), etc.

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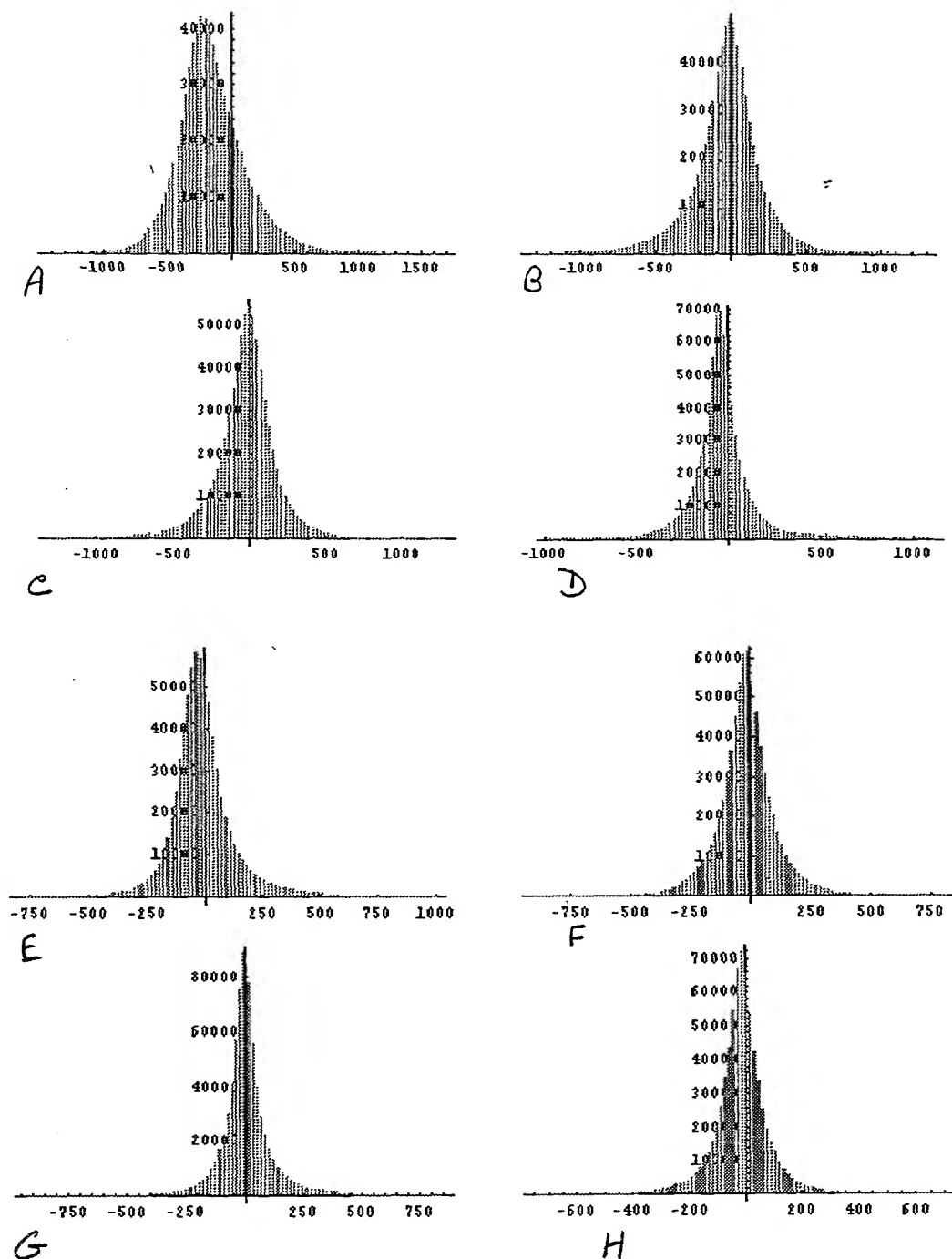
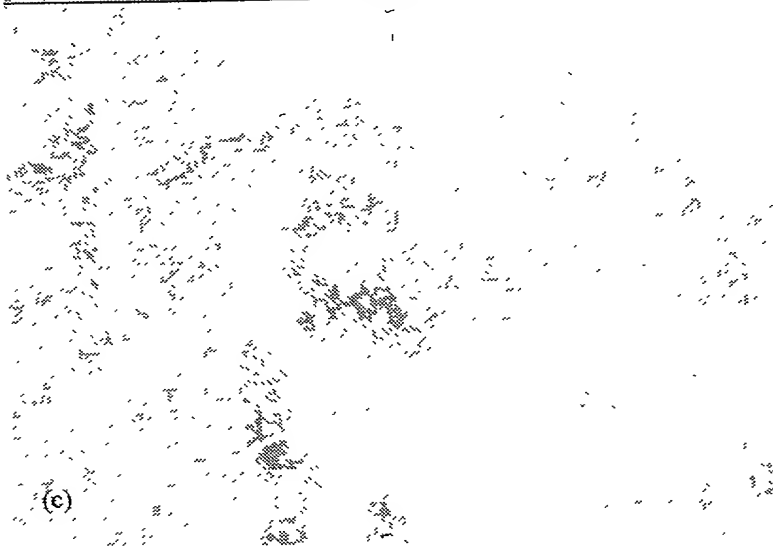


Figure // Distribution of quantization coefficients of first principal components.



Figure/2 Sparse quantization as a method of image coding.

- (a) An original image.
- (b) Reconstruction from projections of subregions into twelve dimensional principal component space.
- (c) Reconstruction from sparse coded and quantized version of (b).

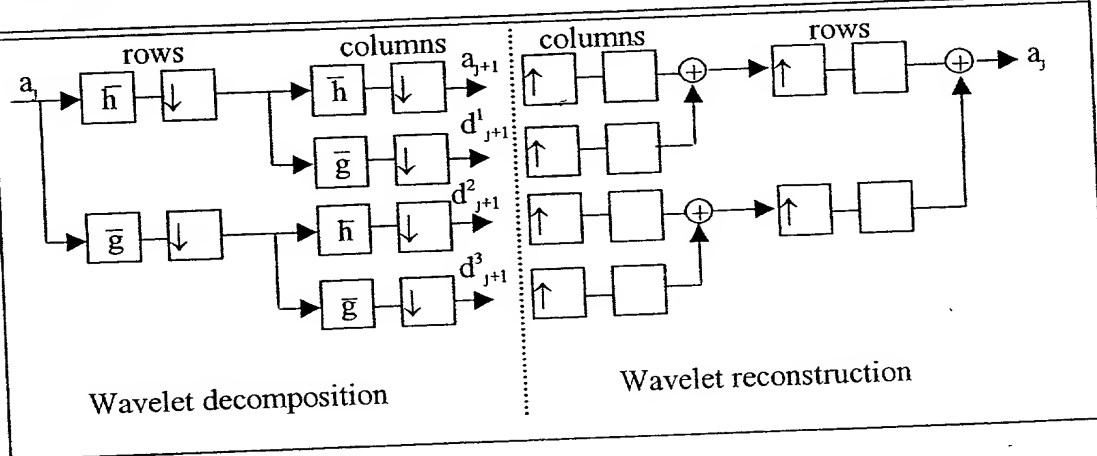
Note that images (b) and (c) do not show all the encoded information. Rather, they shown the reconstructions from the encoding with subregions aligned with a tiled grid of 56x56 face regions. Simultaneous encodings capture further image information as the subregions are offset relative to the region grid.

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Figure 13 A face region captured at three pixel resolutions.

Figure 14 Wavelet decomposition and reconstruction in two dimensions.



8x8 LL	8x8 HL	4x4 HL	2x2 HL
8x8 LH	8x8 HH	4x4 HH	
2x2 LH		4x4 LH	2x2 HH

Figure 15 Wavelet transform coefficients of a face image. Length two Haar filters were used, with $h=(0.7071 \ 0.7071)$, $g=(-0.7071, 0.7071)$. The legend at right identifies the wavelet support size (in full resolution pixels) and the filters used to compute the bands (e.g. HL signifies high pass horizontal, low pass vertical).

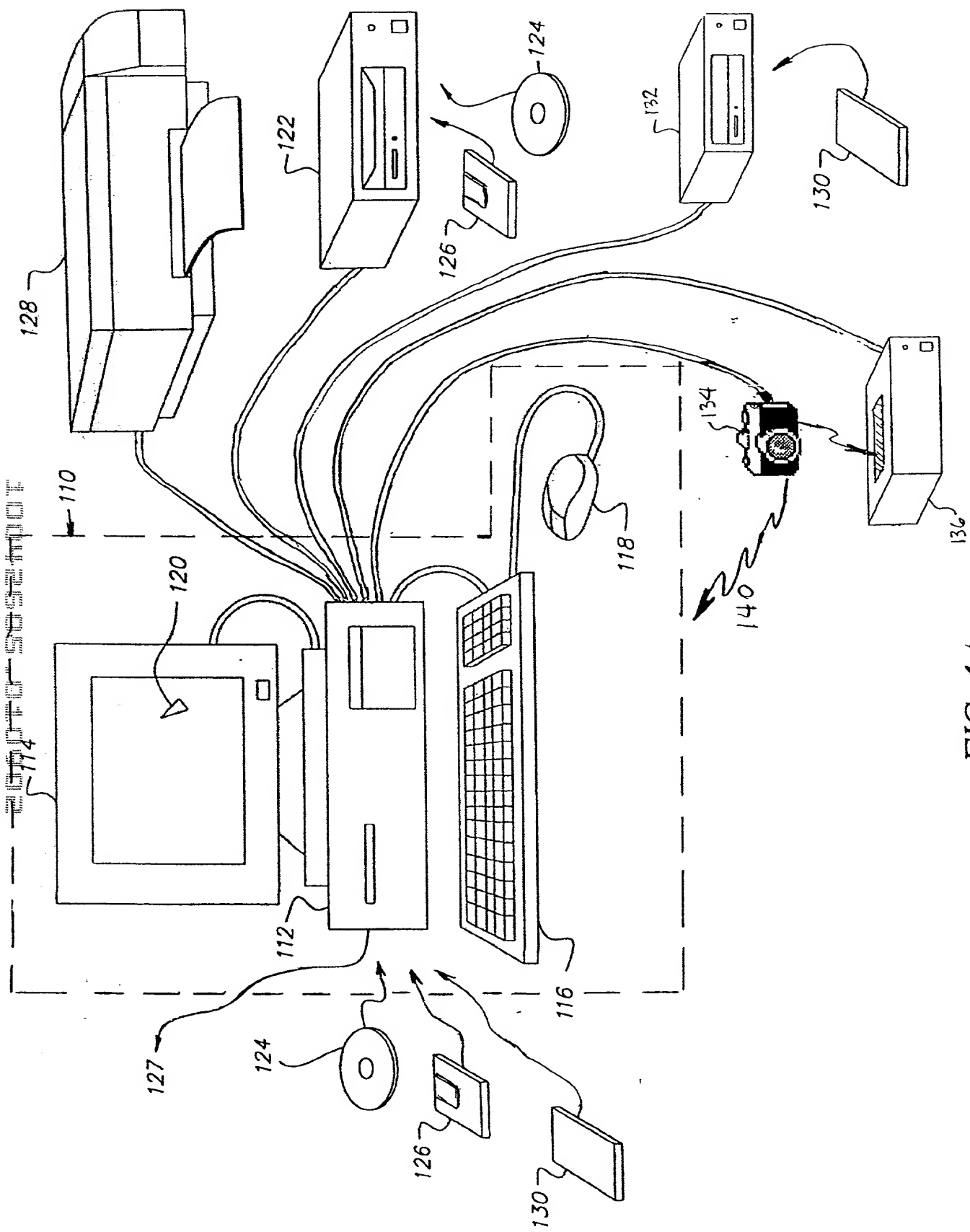


FIG. 16

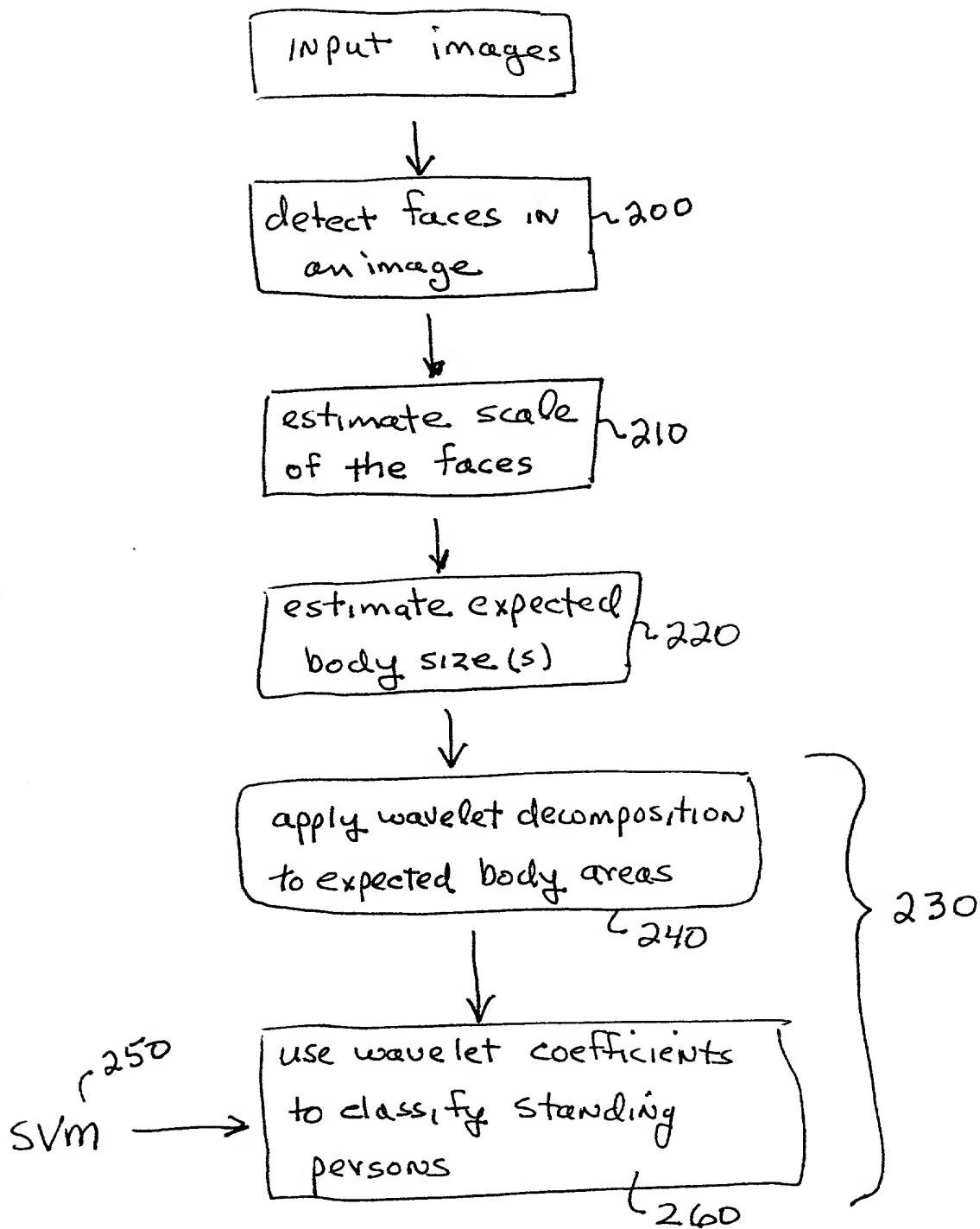


FIG. 17